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Introduction

This is the third year for the litter survey. The study was commissioned by the provincial Department of Environment and Energy. It is designed to look specifically at the issue of roadside litter in Prince Edward Island. The department is working with a multi-stakeholder committee to address litter, as an issue, through regulation and/or education and awareness.

The Prince Edward Island Litter Awareness Committee is comprised of the following organizations:

- Island Waste Management Commission
- PEI Liquor Control Commission
- Tourism PEI
- Tourism Industry Association of Prince Edward Island
- Southeast Environmental Association
- City of Charlottetown
- PEI Department of Environment and Energy
- Prince Edward Island Fluid Milk Processors
- Construction Association of PEI
- Federated Women's Institute of Prince Edward Island
- Federation of Prince Edward Island Municipalities
- PEI Department of Transportation and Public Works

In order to address the issue of litter, the department must first ascertain the extent and nature of the issue. This survey is but one step to understanding litter as an issue in Prince Edward Island.

Survey Methodology

Overview

The methodology used for this survey is a cross section of other surveys completed. The methodology utilizes the standard definitions and procedures that have become more common place.

A survey of litter along Island roadsides was conducted in July 1990. It used roads totalling a length of 515 kilometres as a representative sample for the province. Along these highways, a total of 138 sites of 500 metres each were sampled. It is unclear from the methodology how these sites were determined and why a total of 138 sites were sampled. Since major highways were used in the previous work, they will also form a part of this survey.

Litter Definition

This survey will focus on visible litter which is defined as:

“Litter is an article of human made or human transported solid waste that has been deposited or disposed of in an improper place. Excludes natural flora and fauna, dog and cat litter, agricultural products and tree bark. Articles below bottle cap size (1 inch diameter) such as cigarette butts are excluded. All fragments of a broken glass container, mirror or similar brittle object are counted as one item.” (Ontario Litter, 1990, p. 29)

Three sites representing a different county and a different setting (rural/urban) included cigarette butts in the data recorded. No other litter smaller than one-inch diameter is included at these sites.

Site Length and Width

Each survey site is 100 metres in length with both sides of the road surveyed accounting for 200 metres of linear area surveyed. The width of sites surveyed is determined by the characteristics present at the survey site. The measurement of the width is calculated from the edge of the pavement and extends to the presence of a litter catch point. These features include fences, tall grass or a hedgerow. The maximum site width for a site is 10 metres.

Site Selection

This year's report is a survey of the original 45 sites selected in 2002. At that time, sites were selected at random but were also representative of primary, secondary and clay roads across the urban, suburban and rural setting in Prince Edward Island.

A total number of 45 sites was determined as desirable with one third from each of the urban, suburban and rural areas. This was divided to allow for an equitable number of sites between each of the counties.

Site Alteration Criteria

Once a site has been selected, it will not be rejected due to lack or excess of litter. If a site contains less desirable criteria, it will be moved 500 metres to the northwest to avoid the obstruction. The less desirable criteria includes:

- Bridge - as part of survey site or the majority of the roadside is submerged.
- Construction - a site where the presence of construction and/or demolition debris is obvious due to construction activity.
- Security and safety - addresses concern for the safety of the survey crew. This includes dangerous bank conditions, blind road corners, or a site containing material deemed to be hazardous.
- Waste management facility - survey site is adjacent to a legally authorized waste disposal or recycling facility.
- Women's Institute cleanup - Survey site has obviously been cleaned up as part of the program. Bags are lined up along the road side.

Enforcement Action

Sites containing hazardous materials or what can be deemed to be illegal dumping will be reported immediately to the PEI Department of Environment and Energy via its toll free number (1-800-565-1633). Staff will take photos of the incident area if conditions do not pose a risk to safety.

Sampling Time Frame

Spring time was selected as the sampling time frame to allow for the maximum amount of waste to be found. The sampling will be completed after the snow has left the road side. The sampling will take a couple of weeks and be completed in advance of the annual Women's Institute roadside cleanup to ensure, to the best of our abilities, the results are not impacted.

Quality Control

Surveyors will be trained to conduct the survey through hands-on training. This will take place at three survey sites under full supervision. Results will also be reviewed and compiled on a daily basis. At least five digital photographs will be taken at each site to record the quantity and type of litter representative of the site. It will also be used to help qualify unknown types of litter for data recording purposes.

Surveys will be conducted in teams of at least two with one collecting waste and the other marking the survey sheets. Data recorders will remain constant from the beginning of the survey to the end to ensure consistency in recording.

All litter collected at each site will be bagged for appropriate disposal at a local waste management facility in the part of the province where it was collected.

Reporting Methodology

The final report will contain the following elements:

- Methodology - An overview of the methods used to collect the data and determine the survey sites will be presented.
- Results - Presentation of the results amalgamated collectively for all 45 sites. Results will be presented in graphs as general categories of product types collected. Analysis of the data will also be broken out by region and by the demographics of the sites (rural and urban, etc.)
- Discussion - Limited interpretation of the results will be offered including any confounding issues that may have served to alter the results from the normally anticipated circumstances.
- Appendices - A sample of the data survey sheets and a compendium of the information collected per site will be attached. The information presented per site will include a location description of the survey site and any influencing factors that may account for the observed results.

Results / Discussion

The collection of the survey data takes place over a period of one week. Each site takes an average of 30 minutes to complete once the site is identified and marked for survey. Late snowfalls and a residual of snow in some ditches did make it difficult to get the survey underway.

The time frame of spring was designed to allow for the least alteration in content of roadside litter. All of the waste discarded from the fall and winter would still be present while able to be found amongst the grass and shrubs in the ditch. The timing of the survey was critical with late snow falls covering the work area and getting at the material in advance of the annual Women's Institute roadside cleanup and the Department of Transportation and Public Works crews cleaning roadside areas. It was also noted that bottle collectors had already begun to take material out of the ditches. It is this service that some local residents provide that may alter the sites and therefore the data from its original, intended condition.

Three of the 45 sites were also examined for cigarette butts. The results for each site were 609, 1,320, and 390 butts collected. This item is smaller than the products outlined for collection in the survey methodology, but it was felt that it was important to gain insight into the degree of the problem from this component of litter. While the volume is not very significant, the numbers far exceed other products collected for each survey area. While a time-consuming item to find, collect and count, it is recommended that this item become a component of future litter surveys.

Results

Within the survey there were 22 specific categories and 10 general categories (for items not easily determined) to classify waste items collected. Other than cigarette butts collected only at three sites, the products found most often during the survey were general plastic waste, general paper waste and disposable food service cups.

Since the Waste Watch program has been implemented across the province, areas were not sorted on this basis as they had been in previous surveys.

In the comparison of rural and urban areas, previous surveys had indicated slightly more waste, on average, in the rural areas compared to the urban settings. The 2004 survey shows a reversal with the urban areas having more roadside litter. Food containers, along with general paper and plastic waste, are the leading products found in the urban environment.

The comparison of litter found over the past three years shows that the problem may not have become worse but certainly has not improved either. Examining individual sites it is very visible that some have seen improvement (14, 29, 38) while others were significantly deteriorated (21, 26, 43).

Note: Results are for product numbers and not total volume. All percentages presented have been rounded off to the nearest whole number.

Waste Sorting Categories

All waste was sorted into one of 32 different categories. The categories can be further sorted into five general product types. A list of the categories and *some examples* of each are listed below.

General Type	Category	Examples
Food Container	Cups	includes paper, plastic and styrofoam cups
	Lids	lids for cups
	Straws	
	Paper Food Package	typically a sandwich wrap
	Plastic Food Package	same as above
	Foil Food Package	typically burger wrappings
	Styrofoam Food Package	take out food platters, wrappings
	Sauce Package	small plastic and foil packs for ketchup and sauces
	Napkin	
	Cutlery	plastic knives, forks and spoons
Beverages	Can	soda (pop), juice or other beverage
	Plastic Bottle	pop, liquor, electrolyte drinks
	Glass Bottle	pop, liquor, juice (includes those found broken)
	Carton	typically milk products waxed carton
Confectionary	Chocolate	any candy bar wrapper
	Gum	any parts of the packaging for gum
	Chip Bag	
	Candy Wrap	all other forms of candy wrappings
Containers	Cigarette Pack	
	Tetra Pac	small drinking juice boxes
	Other Beverages	any other not covered under another category
	Plastic Bag	typically shopping bags

Uncategorized	Cardboard	
	Paper	this may include the bag from take out service
	Plastic	
	Glass	
	Styrofoam	
	Cloth	textiles
	Metal	
	C&D Debris	construction and demolition debris
	Car Parts	tires, mufflers and other motorized vehicle or trailer parts
	Garbage Bags	filled garbage bags

Figure 1. Overview of waste found Island-wide by general product category.

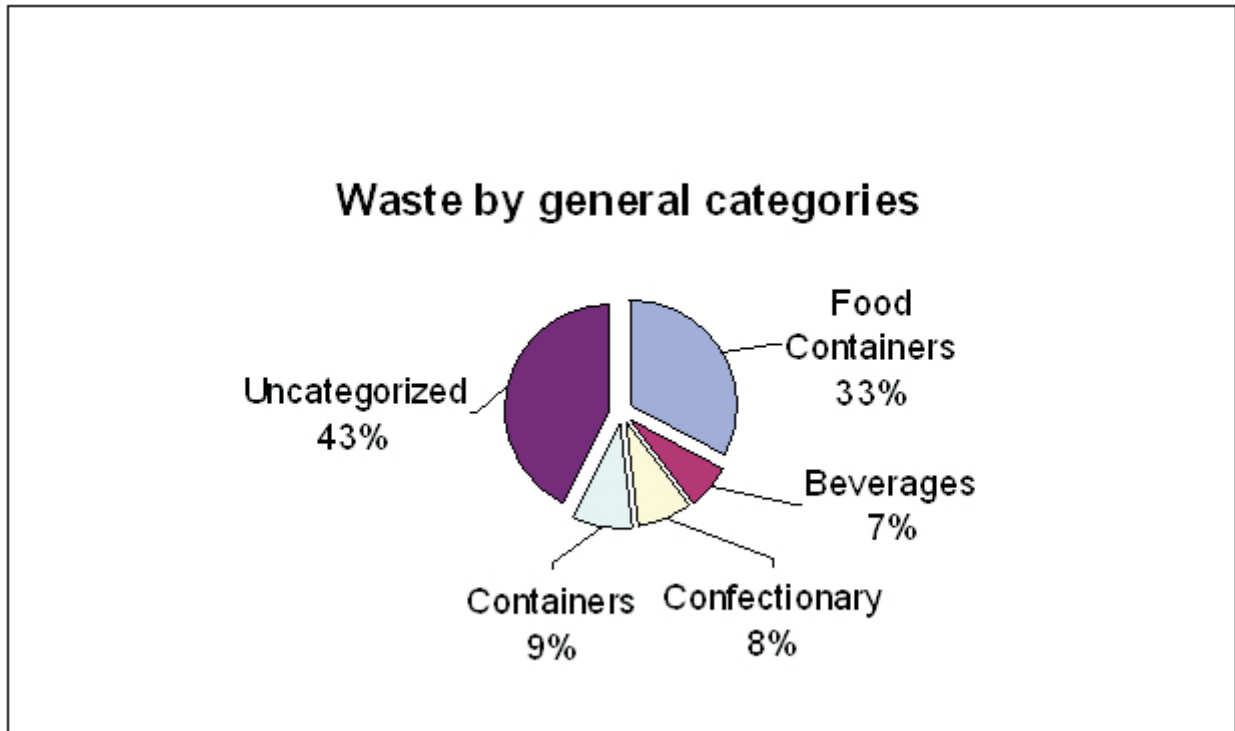


Figure 2. Overview of waste found Island-wide by product type.

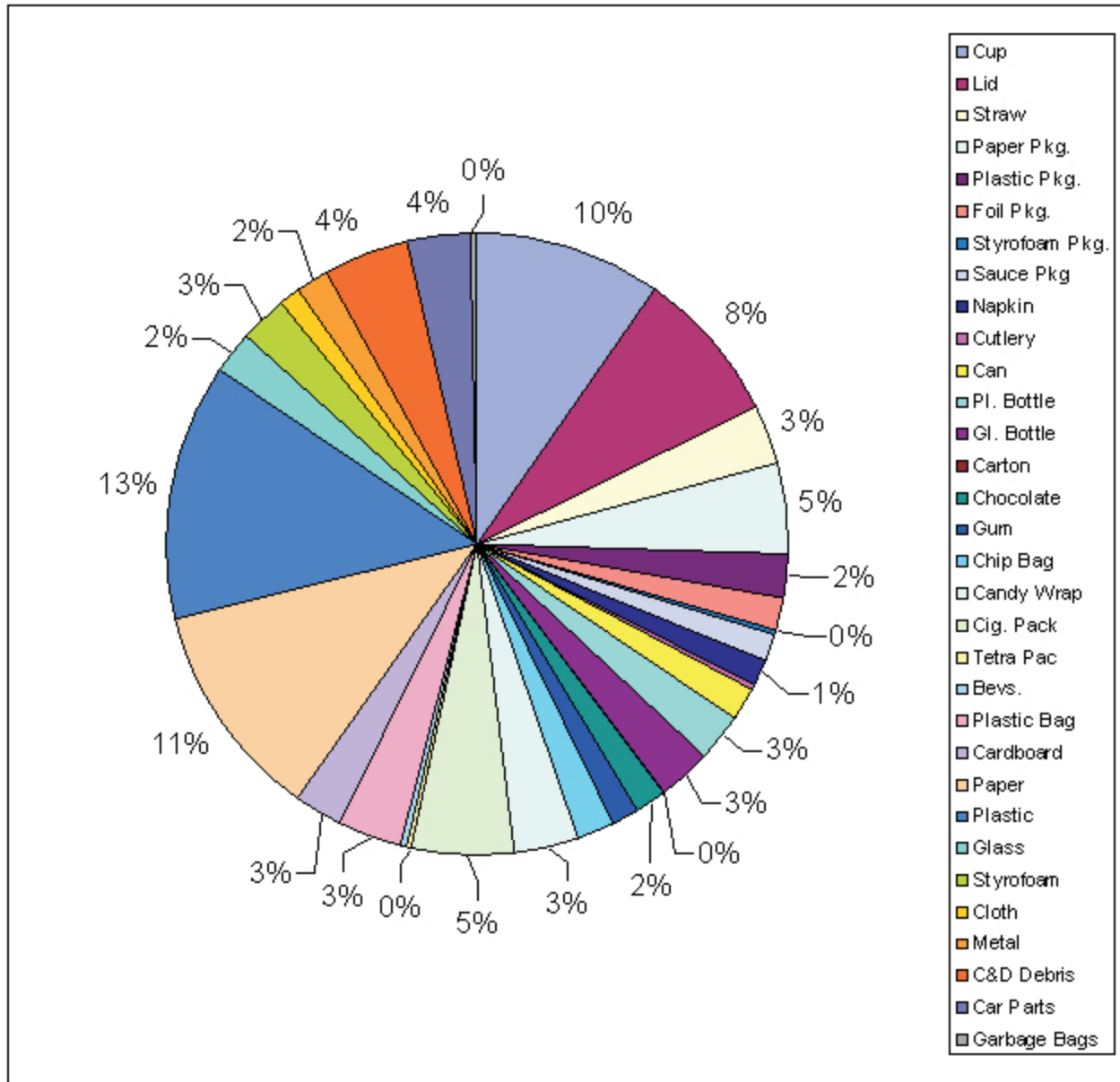


Figure 3. Significant product types of waste found Island-wide.

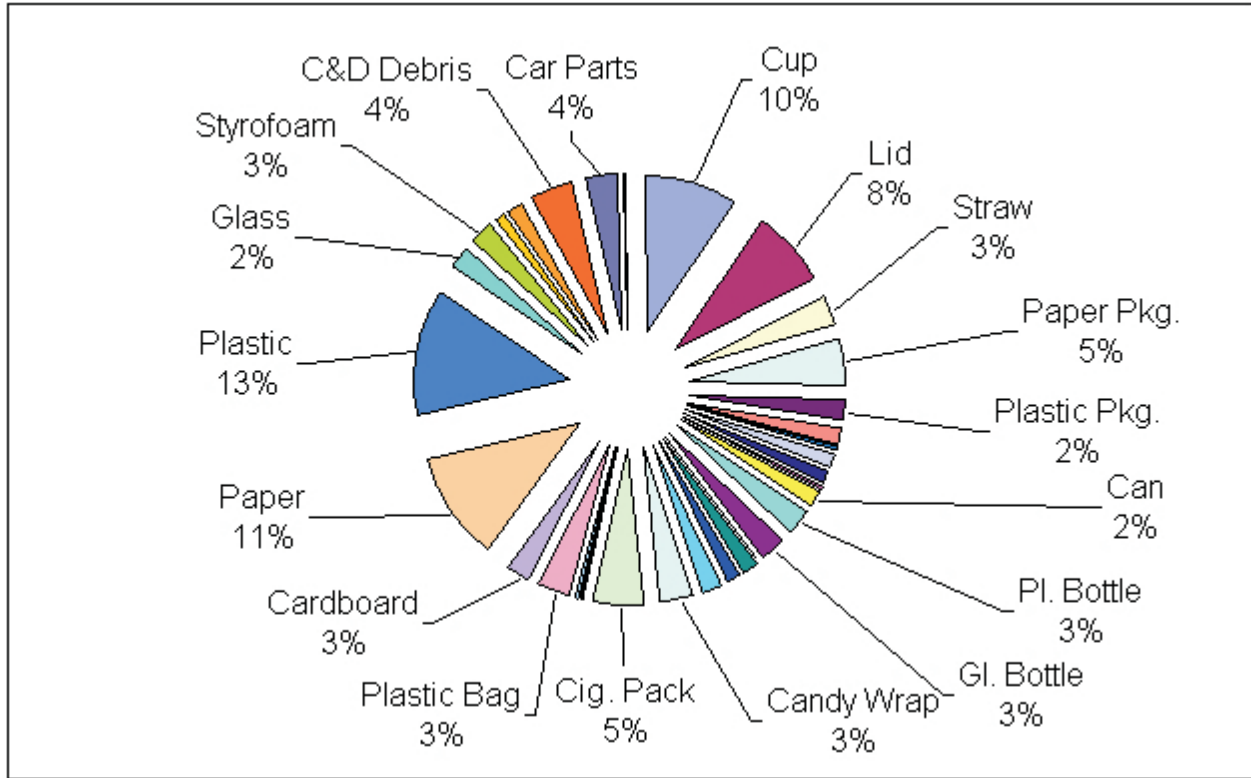
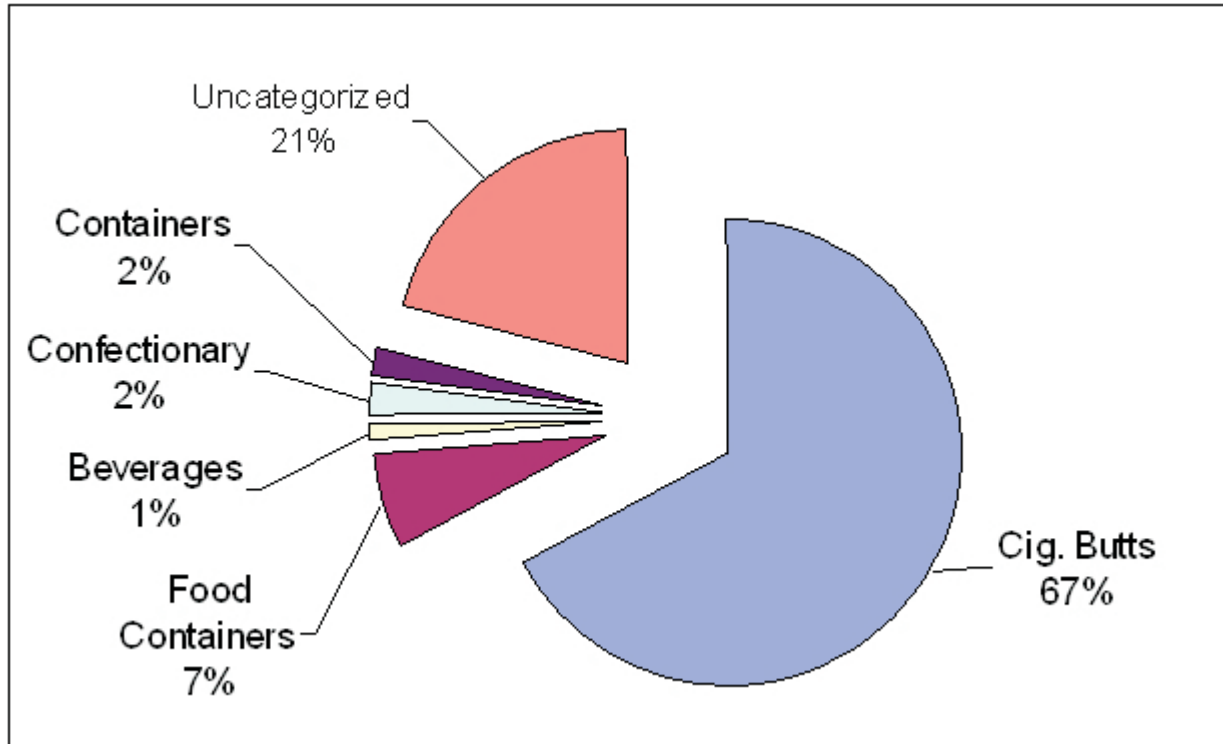


Figure 4. General waste categories for three selected sites including cigarette butts.

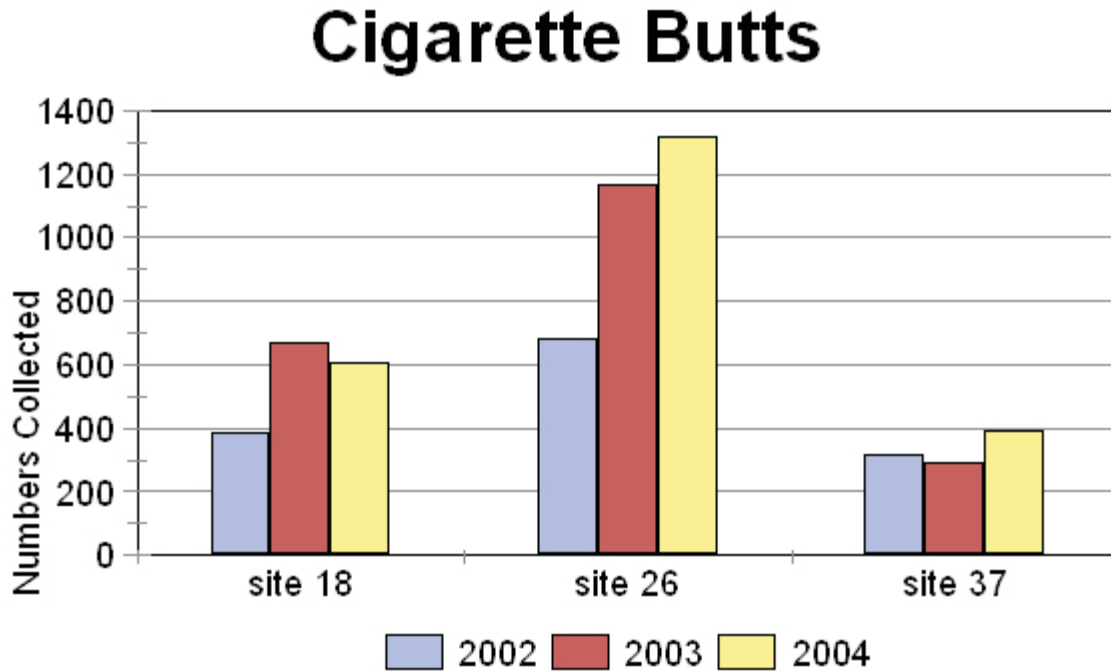


Cigarette Butts

Three of the 45 sites were also examined for cigarette butts. The results for each site in 2002 were 383, 681, and 320; for 2003, the results were 670, 1,166 and 288. In 2004, there were 609, 1,320 and 390 cigarette butts collected at the same sites. The graph above shows the results found at these three sites in comparison to the other major product types. This item was smaller than the products outlined for collection in the survey methodology, but it was felt that it was important to understand this component of litter.

While the overall volume is not significant, the numbers far exceed other products collected for each survey site. The graph on the following page (Figure 5), shows the comparison of cigarette butts collected from each site over the past three years. The problem appears to be increasing. It is also noted that there is an increase in litter from cigarette packages which has gone from 3% (2003) to 5% (2004) of the litter collected.

Figure 5. Comparison of quantities of cigarette butts collected at three selected sites.



Urban and Rural

The initial plan for the study was to dissect regions by rural, urban and suburban areas. This proved difficult to measure for PEI. One cannot distinguish where the urban area ends and the suburban begins. As such, areas were categorized as rural or urban. No sites were collected directly in the downtown core of either Summerside or Charlottetown.

The results show a difference between the rural and urban areas both in terms of the quantity and variety of litter found. It appears that many rural areas were cleaner than their urban counterparts. This is in contrast to the previous two years which saw the reverse trend. A comparison of the materials found is listed by general product category in the figure below.

Figure 6. Average general product category items found per site in urban and rural areas.

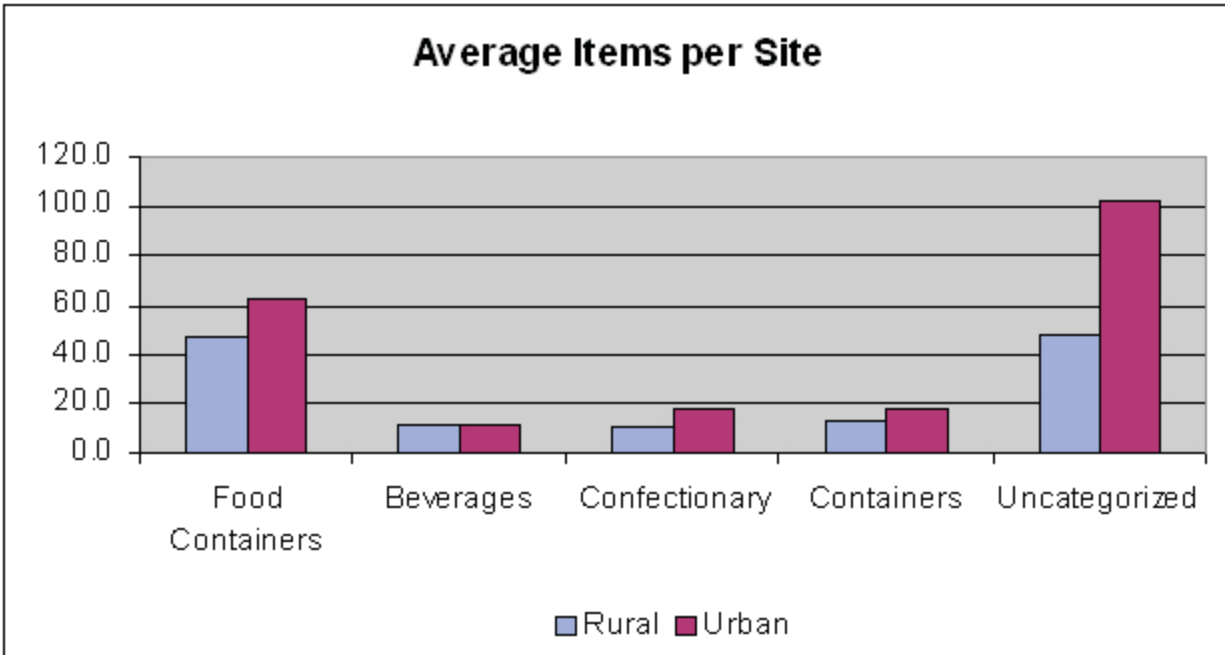


Figure 7. Average food container items found per site in rural and urban areas.

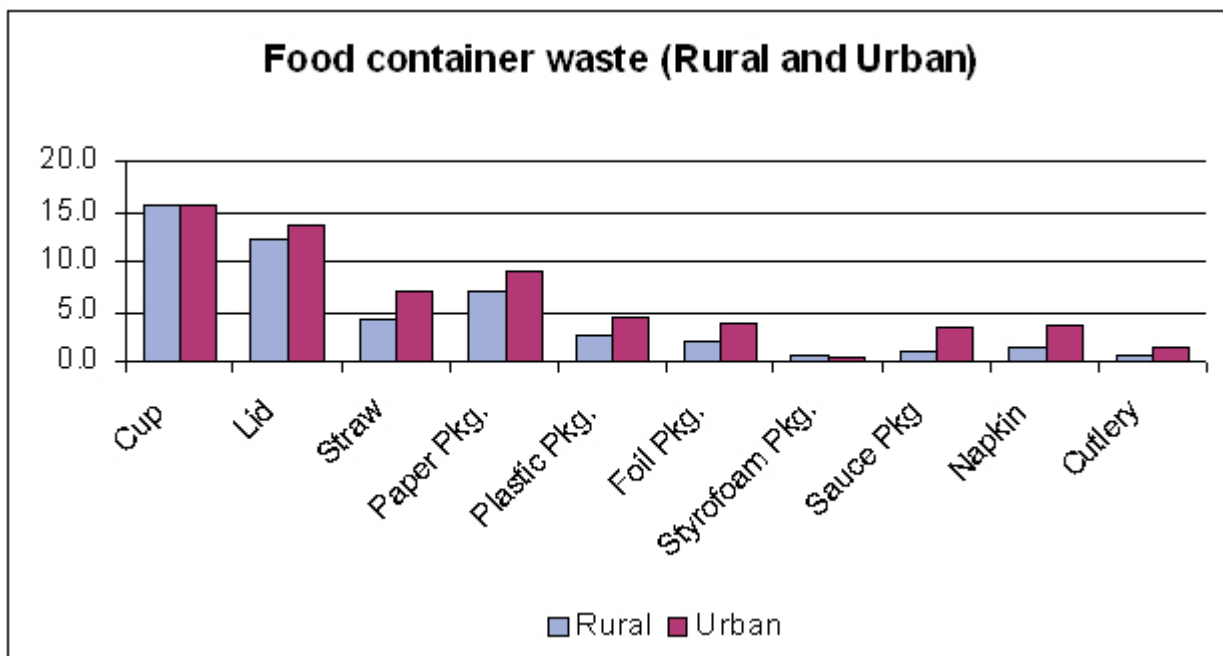


Figure 8. Average beverage and confectionary items found per site in rural and urban areas.

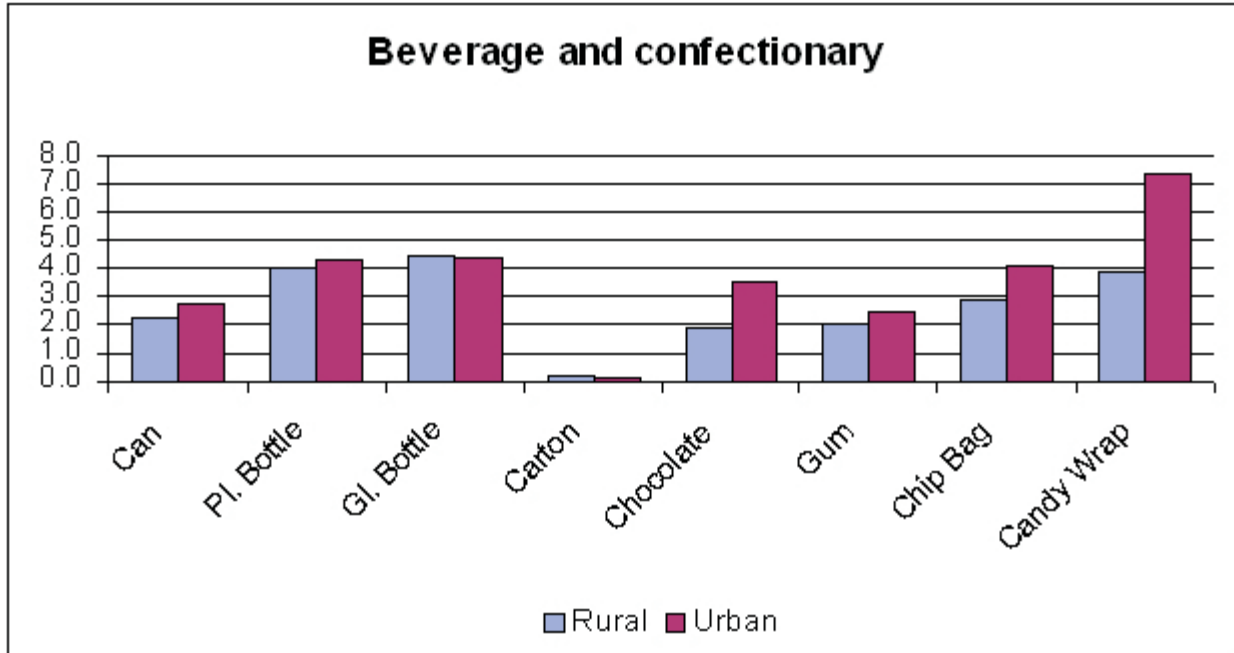
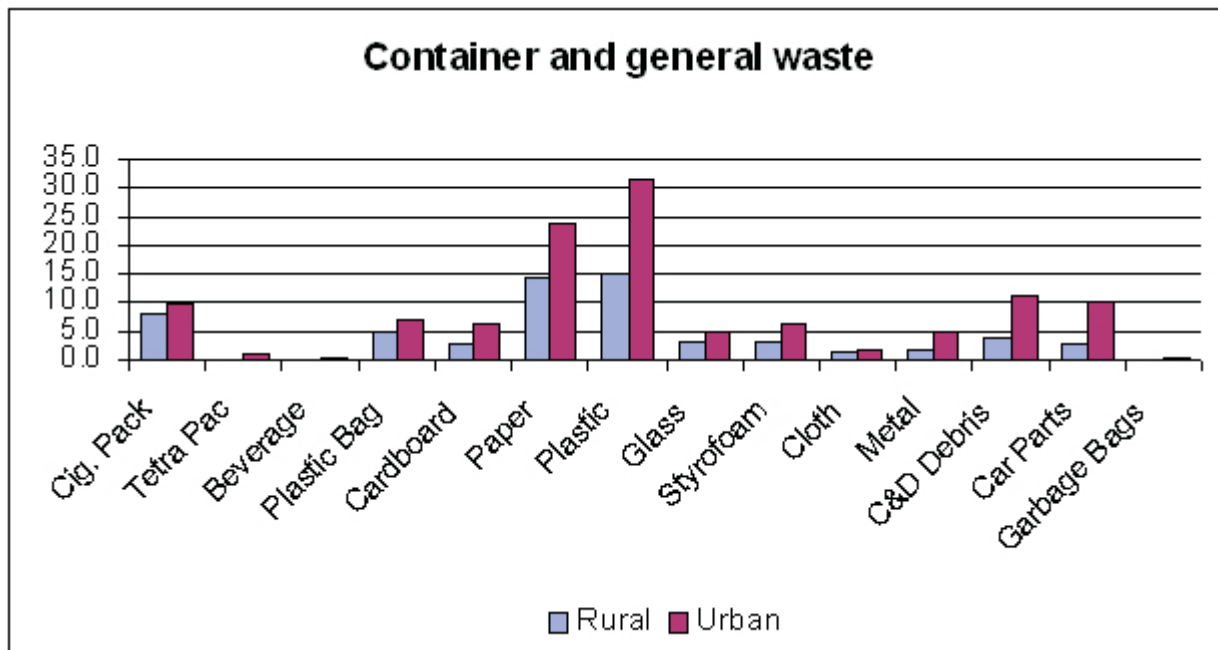


Figure 9. Average container and general waste items found per site in rural and urban areas.



Enforcement Action

Several intact and complete garbage bags were found adjacent to a survey site in the same place that was identified for enforcement action in 2003. These do not show up in the survey itself but under the terms of the methodology, the staff were required to engage enforcement officials to take action.

Yearly Comparison

Having three years of data to compare the progress of the issue of roadside litter, the data reveals that while the issue has not worsened, it has not improved either. The number of cigarette butts collected has increased steadily while waste across other the general categories appears to have remained at a similar level.

Upon closer examination of the data, a few product types have shown an increase. As shown in Figure 11, both paper packaging and plastic packaging from the food container category have noticeably increased this year. Under the beverages category shown in Figure 12, both glass and plastic bottles have increased over the past couple of years. The number of cigarette packs collected was dramatically higher this year, almost doubling the number found per site from the previous two years (see Figure 14). As well, construction and demolition, known as C&D, debris has more than doubled this year with nearly seven items found per site, while it was less than three the previous year.

On a positive note, cartons from the beverage category (Figure 12) and chocolate wrappers from the confectionary category (Figure 13) have both shown a steady decrease.

The site-by-site view of all 45 locations shows that while many remain unchanged there are equal examples of those showing marked improvement as those that have deteriorated (Figure 16 and Figure 17). While this information has been collected while the litter campaign has been implemented, there are several other influencing factors that may be playing a role. Waste Watch has been a factor in changing peoples' attitudes toward disposal at home, but it is unknown how it impacts litter generated by drivers and passengers. The new smoking regulations prevent smoking in public places, resulting in more people smoking in places like their vehicles. This too may be contributing, but its impact is unknown.

Figure 10. Comparison of 2002, 2003 and 2004 general waste categories

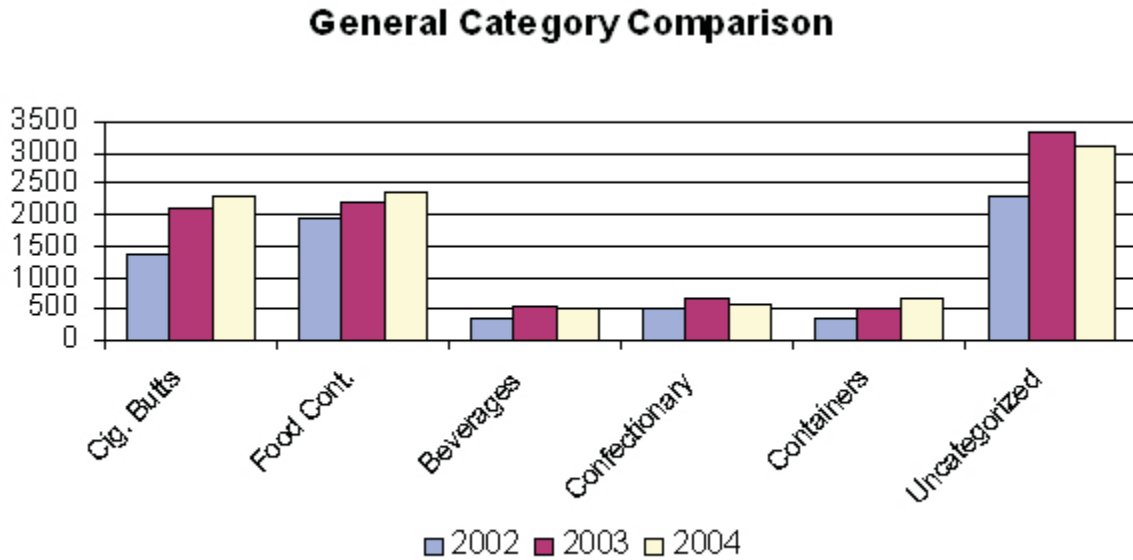


Figure 11. Comparison of 2002, 2003 and 2004 food container categories

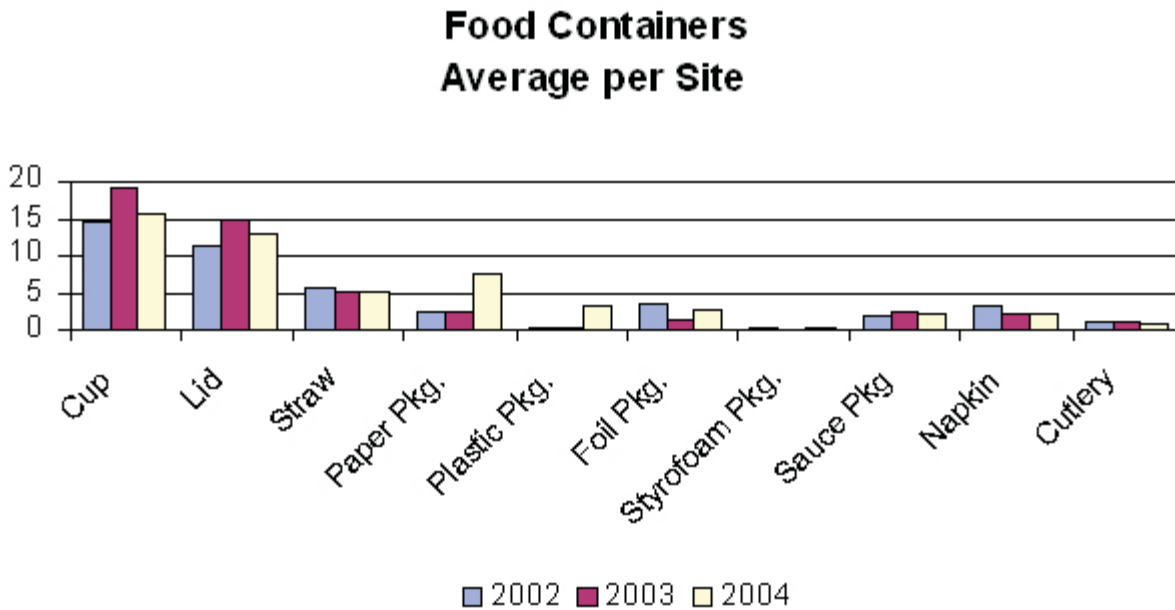


Figure 12. Comparison of 2002, 2003 and 2004 beverage categories

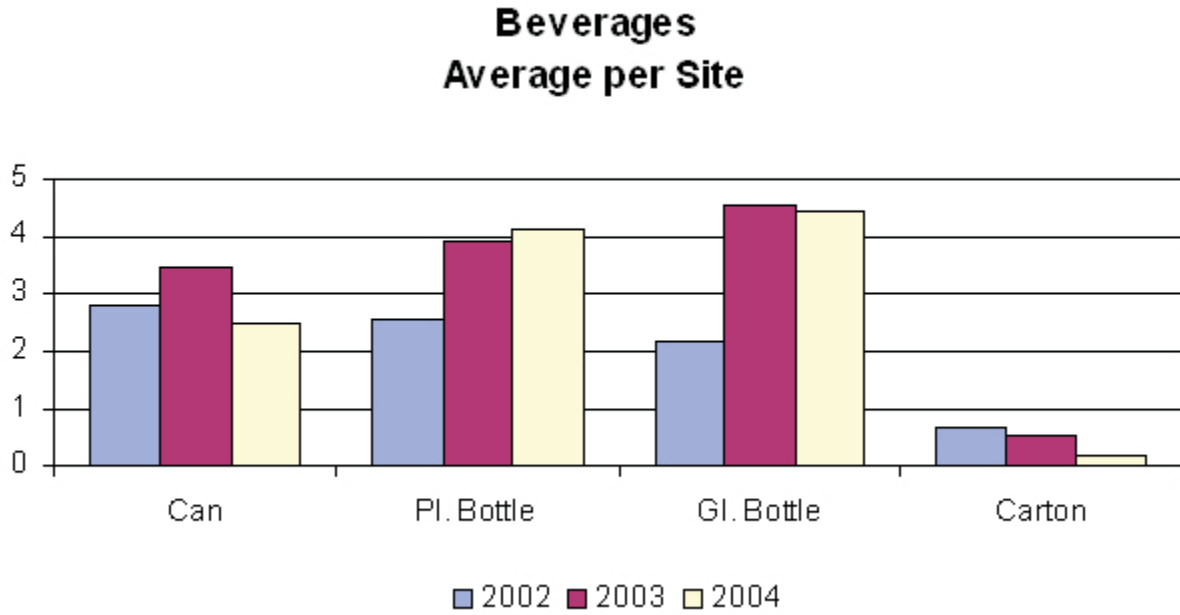


Figure 13. Comparison of 2002, 2003 and 2004 confectionary categories

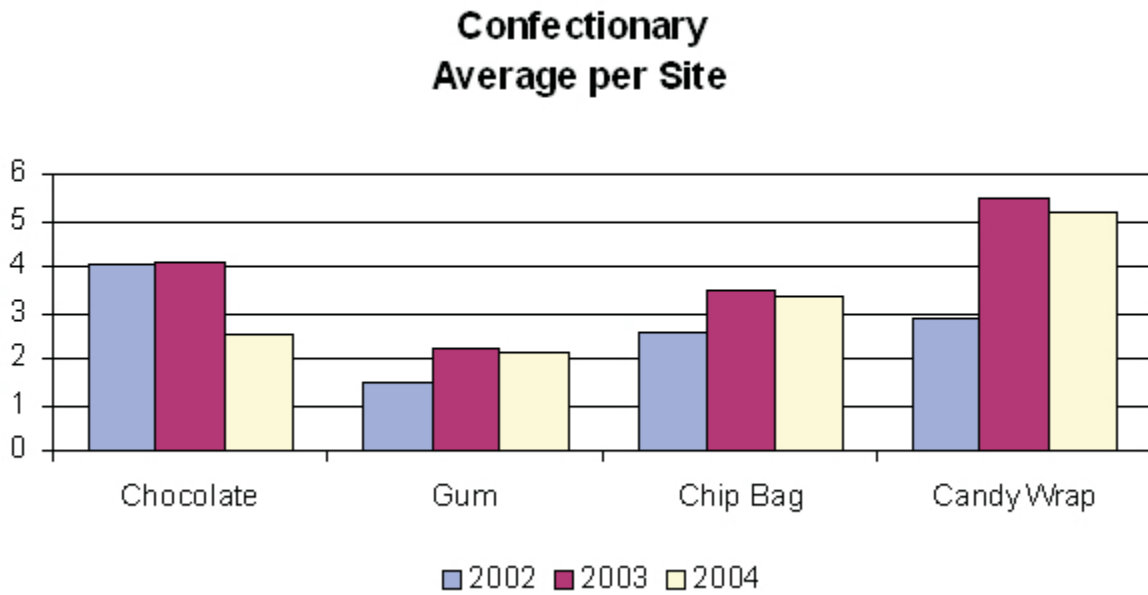


Figure 14. Comparison of 2002, 2003 and 2004 container categories

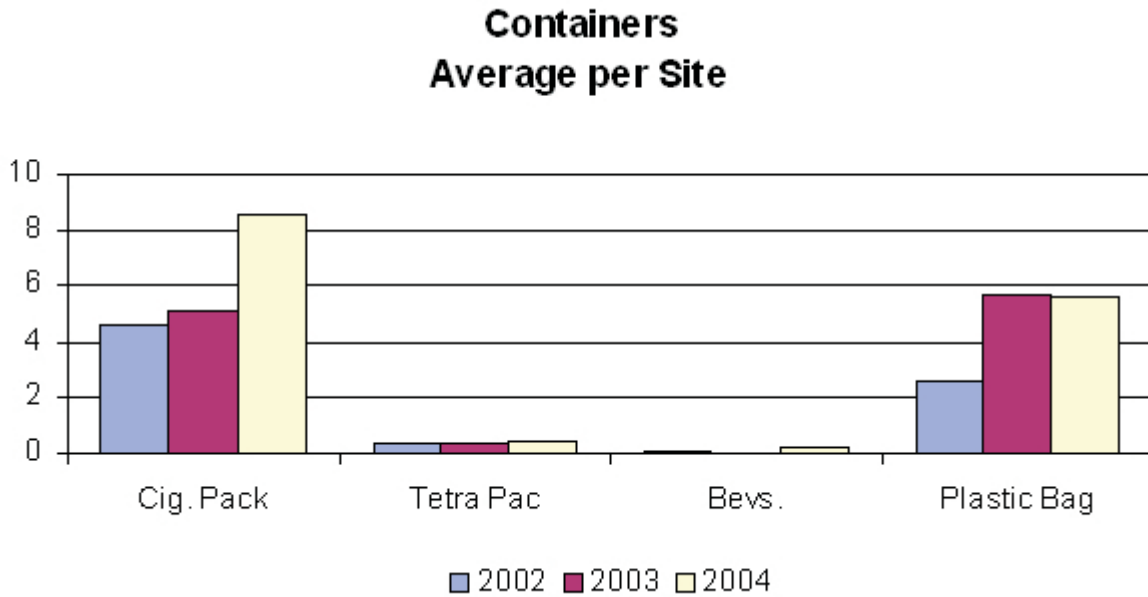


Figure 15. Comparison of 2002, 2003 and 2004 uncategorized waste categories

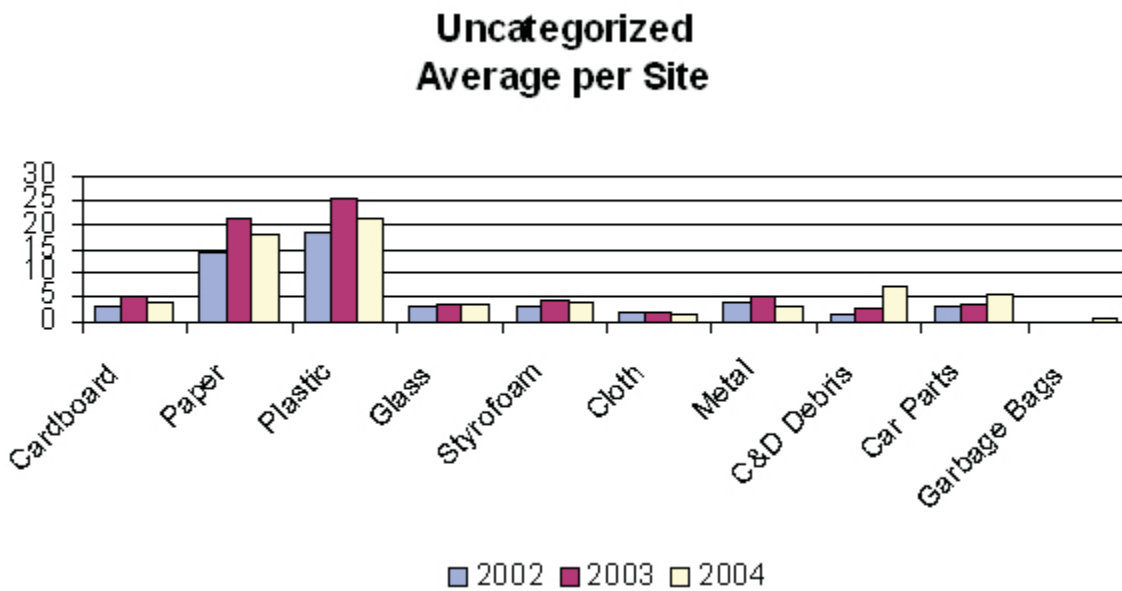


Figure 16. Comparison of 2002, 2003 and 2004 by site (sites 1 - 23).

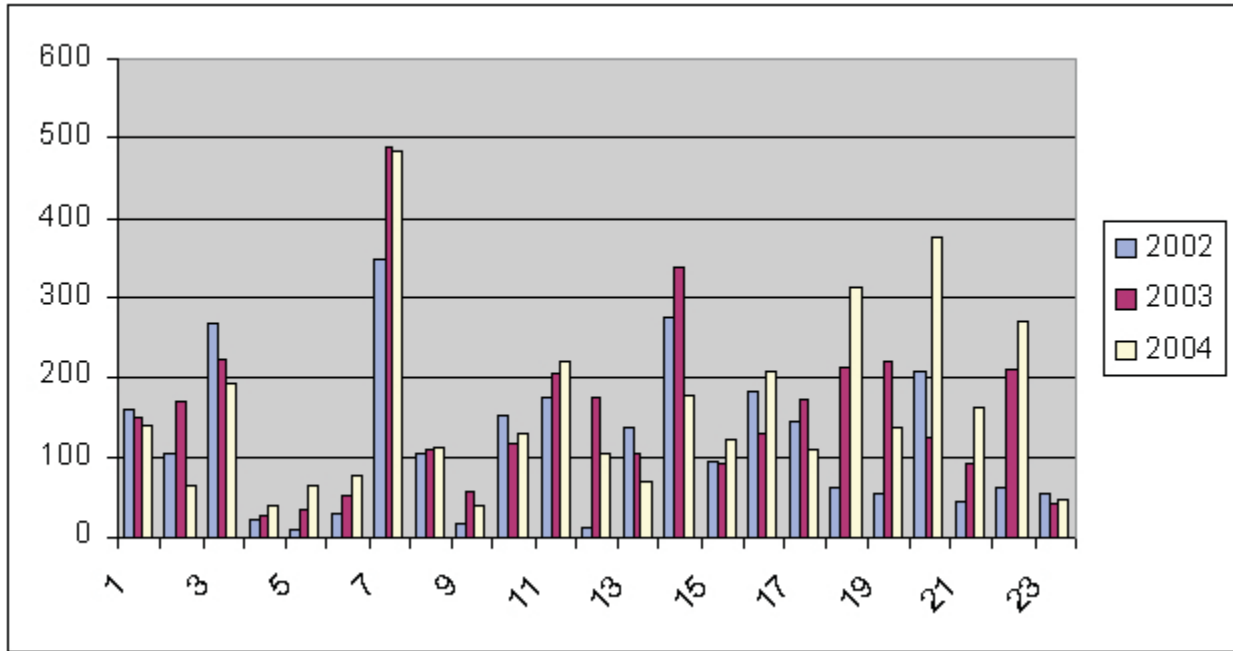
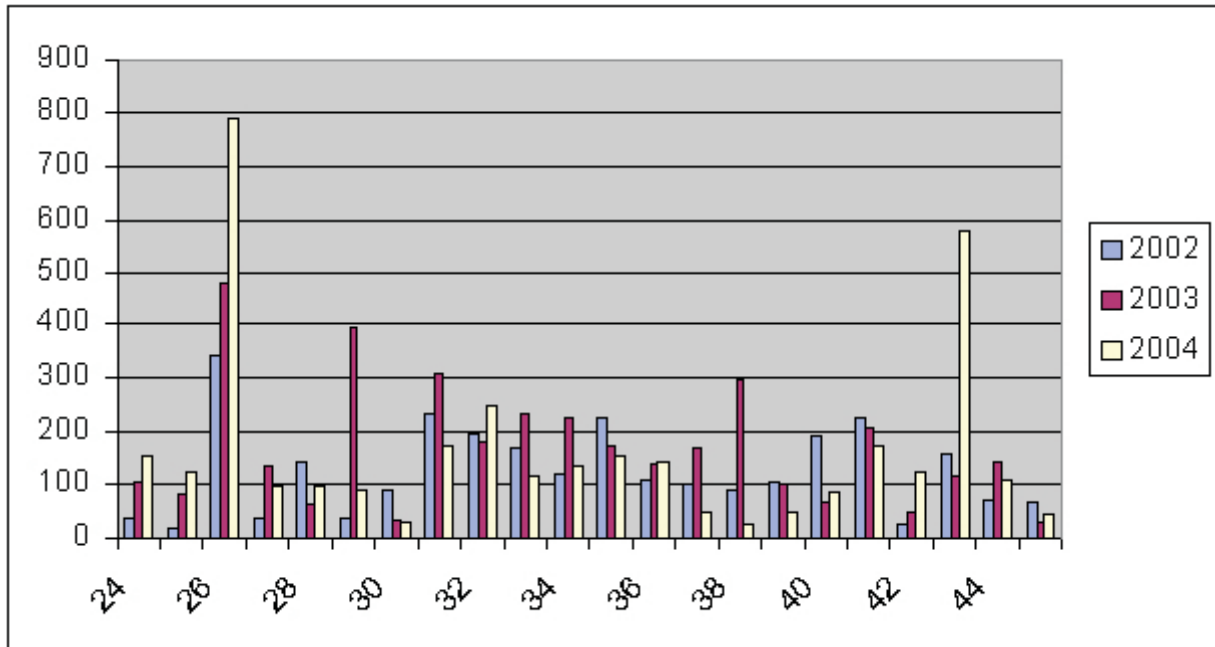


Figure 17. Comparison of 2002, 2003 and 2004 by site (sites 24 - 45).



Appendix 'A' - Survey Locations

<u>No.</u>	<u>Site</u>	<u>County</u>	<u>Setting</u>
1	Wilmot	Kings	Rural
2	Orwell	Kings	Rural
3	Peters Road	Kings	Rural
4	Avondale	Queens	Rural
5	Morell	Kings	Urban
6	Sturgeon	Kings	Rural
7	Hazelbrook	Queens	Rural
8	Dunstaffnage	Queens	Rural
9	Rte 246	Queens	Rural
10	Primrose	Kings	Rural
11	Fortune	Kings	Rural
12	Five Houses	Kings	Rural
13	St. Peters	Kings	Urban
14	Lower Montague	Kings	Rural
15	Cardigan	Kings	Urban
16	Souris	Kings	Rural
17	Kilmuir	Kings	Rural
18	Pooles Corner	Kings	Urban
19	48 Road	Kings	Rural
20	Vernon	Kings	Urban
21	St. Roch	Prince	Rural
22	St. Peters Road	Queens	Urban
23	Rte 104 - Indian River	Prince	Rural
24	Rte 150	Prince	Rural
25	Rte 11 - Abram's Village	Prince	Urban
26	Bypass Road	Queens	Urban
27	Rte 142	Prince	Rural
28	Rte 2 - Springfield	Queens	Rural
29	Rte 2 - Up from Bloomfield Corner	Prince	Urban
30	Rte 224 - St. Anns	Queens	Rural
31	Brookfield	Queens	Rural
32	Brackley Point Road	Queens	Urban
33	Desable	Queens	Rural
34	Inverness/Portage	Prince	Rural
35	Kensington	Prince	Urban
36	Kinkora	Prince	Urban
37	Rte 2 - Summerside	Prince	Urban
38	Central Street - Summerside	Prince	Urban
39	Miscouche	Prince	Urban
40	New London	Queens	Rural
41	St. Hubert	Prince	Rural
42	Rte 12 - Poplar Grove	Prince	Urban
43	Cornwall	Queens	Urban
44	North Tryon	Prince	Rural
45	Summerville Rte 420	Kings	Rural

Appendix 'B'
Average Units per Site
 (100 metres both sides)

PRODUCT	2002 Avg.	2003 Avg.	2004 Avg.	PRODUCT	2002 Avg.	2003 Avg.	2004 Avg.
Cups	14.58	19.02	15.64	Chip Bag	2.62	3.49	3.33
Lids	11.29	14.91	12.80	Candy Wrap	2.84	5.51	5.20
Straws	5.51	5.31	5.13	Cigarette Pack	4.58	5.16	8.60
Paper Food Pkg	2.31	2.38	7.69	Tetra Pac	0.33	0.33	0.42
Plastic Food Pkg	0.33	0.44	3.27	Other Beverages	0.13	0	0.18
Foil Food Pkg	3.47	1.38	2.82	Plastic Bag	2.60	5.71	5.60
Styrofoam Food Pkg	0.40	0.09	0.47	Cardboard	2.84	4.93	4.16
Sauce Pkg	1.58	2.31	2.00	Paper	14.18	21.44	17.96
Napkin	3.02	2.16	2.24	Plastic	18.16	25.67	21.44
Cutlery	1.13	0.91	0.76	Glass	3.11	3.67	3.78
Can	2.78	3.49	2.47	Styrofoam	3.16	4.78	4.16
Plastic Bottle	2.56	3.93	4.13	Cloth	1.82	2.16	1.42
Glass Bottle	2.18	4.56	4.44	Metal	4.02	5.09	3.00
Carton	0.69	0.53	0.16	C&D Debris	1.58	2.78	6.87
Chocolate	4.07	4.09	2.53	Car Parts	2.82	3.31	5.64
Gum	1.51	2.20	2.16	Garbage Bags	0.04	0.02	0.29

Product	2002 Avg.	2003 Avg.	2004 Avg.
Cigarette Butts (3 sites only)	461.33	708.00	773.00

Appendix 'C' - Site-by-Site Comparison

No.	Site	County	Setting	2002	2003	2004
1	Wilmot	Kings	Rural	159	149	140
2	Orwell	Kings	Rural	104	168	64
3	Peters Road	Kings	Rural	268	225	192
4	Avondale	Queens	Rural	22	27	37
5	Morell	Kings	Urban	9	34	64
6	Sturgeon	Kings	Rural	30	52	78
7	Hazelbrook	Queens	Rural	348	487	485
8	Dunstaffnage	Queens	Rural	104	108	113
9	Rte 246 - Stanchel	Queens	Rural	16	59	38
10	Primrose	Kings	Rural	152	119	132
11	Fortune	Kings	Rural	175	203	220
12	Five Houses	Kings	Rural	13	177	104
13	St. Peters	Kings	Urban	137	105	71
14	Lower Montague	Kings	Rural	275	338	179
15	Cardigan	Kings	Urban	97	94	122
16	Souris	Kings	Rural	182	130	208
17	Kilmuir	Kings	Rural	143	171	108
18	Pooles Corner	Kings	Urban	60	214	314
19	48 Road	Kings	Rural	55	219	136
20	Vernon	Kings	Urban	207	124	376
21	St. Roch	Prince	Rural	44	91	163
22	St. Peters Road	Queens	Urban	62	210	270
23	Rte 104 - Indian River	Prince	Rural	54	42	49
24	Rte 150	Prince	Rural	37	103	152
25	Rte 11 - Abram's Village	Prince	Urban	17	82	124
26	Bypass Road	Queens	Urban	343	477	788
27	Rte 142	Prince	Rural	37	134	94
28	Rte 2 - Springfield	Queens	Rural	144	61	94
29	Rte 2 - Up fr. Bloomfield Corner	Prince	Urban	36	396	92
30	Rte 224 - St. Anns	Queens	Rural	89	35	29
31	Brookfield	Queens	Rural	233	312	170
32	Brackley Point Road	Queens	Urban	198	183	247
33	Desable	Queens	Rural	168	233	116
34	Inverness/Portage	Prince	Rural	120	226	132
35	Kensington	Prince	Urban	226	170	152
36	Kinkora	Prince	Urban	109	141	146
37	Rte 2 - Summerside	Prince	Urban	100	168	46
38	Central Street - Summerside	Prince	Urban	90	299	25
39	Miscouche	Prince	Urban	107	102	50
40	New London	Queens	Rural	192	67	87
41	St. Hubert	Prince	Rural	225	205	170
42	Rte 12 - Poplar Grove	Prince	Urban	22	47	124
43	Cornwall	Queens	Urban	156	116	578
44	North Tryon	Prince	Rural	71	145	110
45	Summerville Rte 420	Kings	Rural	65	31	45

Appendix 'D' Sample Survey Sheet

Site# _____

Samplers _____

Date/Time _____

Samplers _____

Beginning Point:

End Point:

Data Sheet

Cup	Lid	Straw	Container	Sauce	Napkin	Cutlery

Can	Plastic Bottle	Glass Bottle	Carton

Chocolate	Gum	Chip Bag	Candy Wrap

Cigarette Pack	Tetra Pac	Beverages	Plastic Bag

Cardboard		
Paper		
Plastic		
Glass		
Styrofoam		
Cloth		
Metal		
Construction Debris		
Car Parts		
Full garbage bags		

Notes:

.....

.....